

1 **I. WITNESS INTRODUCTION**

2
3 **Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

4
5 A. My name is Jenny Hudson. My business address is 7135 Janes Avenue, Woodridge,
6 Illinois, 60517.

7
8 **Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

9
10 A. I am employed as a Senior Project Manager by EN Engineering, an engineering and
11 consulting firm specializing in pipeline design services for the oil and gas industry.

12
13 **Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND**
14 **PROFESSIONAL EXPERIENCE.**

15
16 A. I hold a B.S. degree in Geological Engineering from the University of Missouri-Rolla.
17 Additionally, I am a registered Professional Engineer in the State of Illinois as well as a
18 registered NACE Cathodic Protection Technologist.

19
20 My professional experience consists of employment in the pipeline industry with EN
21 Engineering and previously with Nicor Gas. While at Nicor Gas I had roles in the
22 Storage Department as well as in the Corrosion Control Department. At EN Engineering,
23 my responsibilities have been focused in the areas of corrosion control and pipeline
24 integrity. My current responsibilities include developing and reviewing Integrity
25 Management plans and procedures as well as technical oversight of External and Internal
26 Corrosion Direct Assessments. My resume is included in Exhibit A.

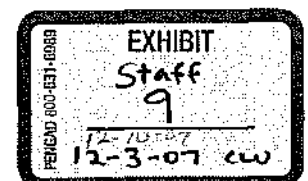
27
28 **Q. ON WHOSE BEHALF WAS THIS TESTIMONY PREPARED?**

29
30 A. This testimony was prepared on behalf of the Staff of the South Dakota Public
31 Utilities Commission (Staff).

32
33 **II. PURPOSE OF THE TESTIMONY**

34
35 **Q. PLEASE STATE THE PURPOSE OF YOUR TESTIMONY IN THIS**
36 **PROCEEDING.**

37
38 A. The main objective of the Staff in this testimony is to ensure that TransCanada
39 Keystone Pipeline, LP (Keystone) has met the requirements of the Federal Pipeline
40 Safety Regulations 49CFR 195, Transportation of Hazardous Liquids by Pipeline, with
41 respect to Keystone's application for a permit (Permit) to construct and operate a crude
42 oil pipeline in South Dakota. This testimony deals specifically with the area of Integrity
43 Management (§195.452).



1 **Q. HOW WILL YOUR TESTIMONY BE ORGANIZED?**

2
3 The testimony will address the relevant portions of the Federal requirements related to
4 integrity management.
5

6 **III. INTEGRITY MANAGEMENT**

7
8 **Q. CAN YOU PLEASE DESCRIBE THE PURPOSE OF THE LIQUID**
9 **INTEGRITY MANAGEMENT RULE?**

10
11 A. Yes. After several high profile pipeline ruptures in the United States, the U. S.
12 government identified the need to implement additional regulations pertaining to the
13 integrity of hazardous liquid pipelines. The rule includes specific regulations to assess,
14 evaluate and analyze the integrity of hazardous liquid pipeline segments that in the event
15 of a pipeline release could affect the public and the environment.
16

17 **Q. WHEN DID THE HAZARDOUS LIQUID INTEGRITY MANAGEMENT**
18 **RULE BECOME EFFECTIVE?**

19
20 A. For hazardous liquid pipeline operators with greater than 500 miles of pipe, the final
21 rule went into effect May 29, 2001. For hazardous liquid pipeline operators with less
22 than 500 miles of pipe, the final rule went into effect February 15, 2002.
23

24 **Q. DID YOU REVIEW A COPY OF THE TRANSCANADA LIQUID**
25 **INTEGRITY MANAGEMENT PLAN?**

26
27 A. No. Per §195.452, a pipeline operator is not required to have a written integrity
28 management plan until one (1) year after the date the pipeline begins operation.
29 TransCanada has stated that development of the integrity management plan for the
30 Keystone Pipeline will begin in 2008.
31

32 **Q. HAS TRANSCANADA OPERATED LIQUID PIPELINES SINCE THE**
33 **HAZARDOUS LIQUID INTEGRITY MANAGEMENT RULES BECAME**
34 **EFFECTIVE?**

35
36 A. No. TransCanada has not operated liquid pipelines since the 1990s. This was before
37 the hazardous liquid integrity management rule went into effect.
38

39 **Q. ARE NATURAL GAS PIPELINES GOVERNED BY A SIMILAR RULE?**

40
41 A. Yes, natural gas pipelines are governed by 49 CFR Part 192, Subpart O, which is the
42 natural gas integrity management rule.
43
44
45

1 **Q. HAS TRANSCANADA OPERATED NATURAL GAS PIPELINES SINCE**
2 **THE NATURAL GAS INTEGRITY MANAGEMENT RULE BECAME**
3 **EFFECTIVE?**

4
5 A. Yes.

6
7 **Q. ARE ANY OF THE NATURAL GAS PIPELINE ASSETS OWNED OR**
8 **OPERATED BY TRANSCANADA SUBJECT TO THE NATURAL GAS**
9 **INTEGRITY MANAGEMENT RULE?**

10
11 A. Yes. TransCanada has natural gas pipeline assets in both the United States and in
12 Canada. The natural gas pipelines in the United States are subject to 49 CFR Part 192
13 Subpart O.

14
15 **Q. HAS THE TRANSCANADA NATURAL GAS INTEGRITY MANAGEMENT**
16 **PLAN BEEN SUBJECT TO A JURISDICTIONAL AUDIT?**

17
18 A. Yes.

19
20 **Q. CAN YOU PLEASE DESCRIBE THE ENFORCEMENT ACTIONS THAT**
21 **MAY RESULT FROM A JURISDICTIONAL AUDIT?**

22
23 A. Yes. Common enforcement actions resulting from a jurisdictional natural gas
24 integrity management audit include a Notice of Probable Violation and a Notice of
25 Amendment.

26
27 **Q. CAN YOU PLEASE DESCRIBE WHAT A NOTICE OF PROBABLE**
28 **VIOLATION AND A NOTICE OF AMENDMENT ARE?**

29
30 A. Yes. Specific to the integrity management rule, a Notice of Probable Violation is a
31 notice issued by the Pipeline and Hazardous Materials Safety Administration (PHMSA)
32 indicating that laws or regulations related to the integrity management rule may have
33 been violated by the pipeline operator. Depending upon the nature of the violation, a
34 civil penalty or compliance order may be proposed.

35
36 Specific to the integrity management rule, a Notice of Amendment is a notice issued by
37 the Pipeline and Hazardous Materials Safety Administration (PHMSA) that identifies
38 shortcomings in an operator's integrity management plan or procedures. The Notice of
39 Amendment requires that the operator make modifications to the plan or procedure.

40
41 **Q. HAVE ANY OF THE PIPELINES OWNED OR OPERATED BY**
42 **TRANSCANADA RECEIVED A NOTICE OF PROBABLE VIOLATION AS A**
43 **RESULT OF THEIR JURISDICTIONAL INTEGRITY MANAGEMENT AUDIT?**

44
45 A. No. TransCanada has received a Notice of Amendment, but not a Notice of Probable
46 Violation.

1 **Q. OVER THE LAST FIVE YEARS, HOW MANY FAILURES OR INCIDENTS**
2 **RELATED TO EXTERNAL OR INTERNAL CORROSION HAVE OCCURRED**
3 **ON NATURAL GAS LINES THAT TRANSCANADA OWNS OR OPERATES?**
4

5 A. For the years 2002 to 2007, no failures on natural gas lines attributed to internal
6 corrosion have occurred. Failures as a result of external corrosion are as follows:
7

Date	Country
October 18, 2002	Canada
September 2, 2003	Canada
December 1, 2003	Canada
January 7, 2004	Canada

8
9 **Q. OVER THE LAST FIVE YEARS, HOW MANY FAILURES OR INCIDENTS**
10 **RELATED TO THIRD-PARTY DAMAGE HAVE OCCURRED ON NATURAL**
11 **GAS LINES OWNED OR OPERATED BY TRANSCANADA?**
12

13 A. For the years 2002 to 2007 failures on natural gas lines as a result of third-party
14 damage are as follows:
15

Date	Country
September 7, 2003	Canada
December 23, 2004	Canada
May 25, 2007	USA

16
17 **Q. CAN YOU PLEASE DEFINE A FAILURE AND AN INCIDENT?**
18

19 A. Yes. In the pipeline industry, a failure is often defined as a pipeline component that
20 has become completely inoperable, is still operable but is incapable of satisfactorily
21 performing its intended function, or has deteriorated to the point that it has become
22 unsafe for continued use.
23

24 Per 49 CFR Part 191 §191.3 an incident includes an event that involves the release of gas
25 from a pipeline and:
26

- 27 1. a death or personal injury necessitating in-patient hospitalization; or
- 28 2. estimated property damage, including cost of gas lost, of the operator or others, or
29 both, of \$50,000 or more; or
- 30 3. an event in the judgment of the operator that is significant but did not meet any of
31 the specific criteria.
32
33
34

1 **Q. HAVE YOU REVIEWED THE HAZARDOUS LIQUID HIGH**
2 **CONSEQUENCE AREAS IDENTIFIED IN THE STATE OF SOUTH DAKOTA?**

3
4 A. Yes.

5
6 **Q. CAN YOU PLEASE EXPLAIN WHAT A HIGH CONSEQUENCE AREA IS?**

7
8 A. Yes. For hazardous liquid pipelines, a High Consequence Area (HCA) is defined by
9 49 CFR Part 195 §195.450 as one of the following: a commercially navigable waterway,
10 a high population area, an "other" populated area or an unusually sensitive area.

11
12 A high population area is further defined as an urbanized area that contains 50,000 or
13 more people and has a population density of at least 1,000 people per square mile.

14
15 An "other" populated area is further defined as a place defined and delineated by the U.S.
16 Census Bureau that contains a concentrated population such as an incorporated or
17 unincorporated city, town, village or designated residential or commercial area.

18
19 An unusually sensitive area is defined by 49 CFR Part 195 §195.6 as a drinking water or
20 ecological resource area that is unusually sensitive to environmental damage from a
21 hazardous liquid pipeline release.

22
23 Examples of a drinking water resource include but are not limited to the water intake for
24 a Community Water System or a Non-Transient Non-community Water System that
25 obtains its water supply primarily from a surface water source and does not have an
26 adequate alternative drinking water source, and a sole source aquifer recharge area where
27 the sole source aquifer is a karst aquifer.

28
29 Examples of ecological resources include but are not limited to a multi-species
30 assemblage area, a migratory water bird concentration area and an area containing an
31 imperiled or endangered species.

32
33 **Q. HOW MANY MILES OF PIPE HAS TRANSCANADA DETERMINED WILL**
34 **AFFECT AN HCA IN THE STATE OF SOUTH DAKOTA?**

35
36 A. TransCanada has identified 40.7 miles of pipe that has the possibility to affect a HCA
37 in the event of a pipeline release.

38
39 **Q. HOW MANY INDIVIDUAL HCAS HAVE BEEN IDENTIFIED AS HAVING**
40 **THE POTENTIAL TO BE AFFECTED IN THE EVENT OF A PIPELINE**
41 **RELEASE?**

42
43 A. In the state of South Dakota, TransCanada has identified nine (9) HCA locations.
44
45
46

1 **Q. CAN YOU PLEASE EXPLAIN HOW TRANSCANADA IDENTIFIED HCAS**
2 **ALONG THE PROPOSED PIPELINE ROUTE?**

3
4 A. Yes. The United States Department of Transportation (USDOT) has developed maps
5 showing the locations of HCAs throughout the nation. The USDOT obtained the
6 information for the maps from organizations such as the U.S. Census Bureau and the
7 Environmental Protection Agency. These maps are available to pipeline operators via the
8 National Pipeline Mapping System (NPMS). TransCanada obtained HCA information
9 for the State of South Dakota from the NPMS.

10
11 **Q. CAN YOU PLEASE EXPLAIN THE APPROACH TRANSCANADA USED TO**
12 **IDENTIFY THE HCAS THAT COULD BE AFFECTED IN THE EVENT OF A**
13 **PIPELINE RELEASE?**

14
15 A. Yes. TransCanada screened HCAs to determine which HCAs were within a
16 reasonable proximity to the Keystone centerline and also had a possible pathway to
17 transport a spill to the HCA. TransCanada evaluated three (3) spill pathways: overland
18 flow, subsurface flow and downstream transport.

19
20 For the overland flow scenario, TransCanada used a proximity criterion of one (1) mile -
21 they assumed overland transport of crude oil could reach an HCA one (1) mile away.

22
23 TransCanada did not perform a detailed analysis of the subsurface flow scenario and
24 instead assumed a proximity criterion of one (1) mile. In other words, they assumed
25 subsurface flow could transport a spill to groundwater unusually sensitive areas up to one
26 (1) mile away from the pipeline centerline.

27
28 For the downstream transport scenario, TransCanada applied a proximity criterion of five
29 (5) miles. They assumed HCAs located downstream and within five (5) river miles of the
30 pipeline centerline could be affected in the event of a release.

31
32 **Q. HAS TRANSCANADA UTILIZED A "SAFE DISTANCE" WHEN**
33 **IDENTIFYING SECTIONS OF PIPELINE THAT WILL AFFECT AN HCA?**

34
35 A. Yes. Instead of the term "safe distance", TransCanada uses the term "proximity
36 criteria". As previously stated, TransCanada used proximity criteria as follows:

37
38 Overland flow – one (1) mile
39 Subsurface flow – one (1) mile
40 Downstream transport – five (5) miles

41
42 **Q. HAS TRANSCANADA JUSTIFIED THESE PROXIMITY CRITERIA?**

43
44 A. From the information available to me, I have not seen technical justification for these
45 proximity criteria. "Appendix B Preliminary Evaluation of Risk to High Consequence
46 Areas" states the identification of pipeline segments that could affect an HCA is

1 preliminary. It is acceptable to use assumptions, such as the proximity criteria for an
2 initial evaluation such as this. The expectation is prior to the Keystone Pipeline going
3 into service, TransCanada will further refine the pipeline segments having the ability to
4 affect an HCA. This could entail TransCanada determining that some pipeline segments
5 currently identified as affecting an HCA do not actually have the capability. Likewise,
6 TransCanada could identify additional pipeline segments that could affect an HCA.

7
8 Prior to going into service, the Pipeline and Hazardous Material and Safety
9 Administration (PHMSA) would expect TransCanada to have a thorough written
10 justification for any assumptions, such as proximity criteria, that are still being used in
11 the analysis.

12
13 **Q. IN THE EVENT OF A RELEASE, HAVE POSSIBLE PATHS ALONG DRAIN**
14 **TILES TO A WATERWAY OR HCA BEEN CONSIDERED?**

15
16 A. Based upon the information I have received, primarily through the review of
17 "Appendix B Preliminary Evaluation of Risk to High Consequence Areas", it does not
18 appear that transport along drain tiles has been specifically evaluated. In a more general
19 sense, transport along drain tiles has been accounted for through the proximity criteria.

20
21 **Q. ARE THERE ANY HCAS THAT WILL BE CROSSED BY THE KEYSTONE**
22 **PIPELINE, BUT IN THE EVENT OF A PIPELINE RELEASE HAVE BEEN**
23 **DETERMINED TO NOT AFFECT THE HCA?**

24
25 A. Yes. In the state of South Dakota there is a groundwater HCA that the proposed
26 pipeline will cross. Through work with the South Dakota Department of Environmental
27 and Natural Resources (SDDENR), TransCanada determined the groundwater HCA
28 could not be affected in the event of a release due to the depth of the groundwater.
29 Additionally, the presence of a thick clay layer between the pipeline and the aquifer
30 would prevent crude oil from reaching the aquifer. See also the TransCanada response to
31 Staff Data Request 6-7.

32
33 **Q. CAN YOU PLEASE DEFINE A PREVENTIVE AND MITIGATIVE**
34 **MEASURE?**

35
36 A. Yes. In the pipeline industry, a preventive and mitigative measure is generally
37 defined as a measure to prevent and mitigate the consequences of a pipeline failure.
38 Examples of preventive and mitigative measures include, but are not limited to
39 conducting response drills with local emergency responders, performing line patrols
40 beyond those already required by Part 195 and installing additional valves on the
41 pipeline.

1 **Q. HOW DOES TRANSCANADA PLAN ON DETERMINING PREVENTIVE**
2 **AND MITIGATIVE MEASURES?**

3
4 A. TransCanada plans on using what they refer to as the Maintenance Management
5 Process. This process uses information from various sources including risk assessment,
6 regular operation and maintenance activities and integrity management activities as a
7 trigger to identify additional preventive and mitigative measures.

8
9 **Q. CAN YOU PLEASE EXPLAIN WHAT AN EMERGENCY FLOW**
10 **RESTRICTING DEVICE IS?**

11
12 A. Yes. An Emergency Flow Restricting Device (EFRD) is defined in Part 195 §195.40
13 as a check valve or remote control valve.

14
15 A check valve is further defined as a valve that permits fluid to flow freely in one
16 direction and contains a mechanism which automatically prevents flow in the opposite
17 direction.

18
19 A remote control valve is further defined as any valve that is operated from a location
20 remote from the location where the valve is actually installed.

21
22 **Q. CAN YOU DESCRIBE THE PROCESS TRANSCANADA USED TO**
23 **IDENTIFY THE LOCATIONS FOR EMERGENCY FLOW RESTRICTION**
24 **DEVICES?**

25
26 A. Yes. 49 CFR 195 requires that valves be placed on either side of large rivers and on
27 each side of a reservoir containing water for human consumption. TransCanada initially
28 placed valves to meet these minimum federal requirements. Once the pipeline segments
29 having the ability to affect an HCA in the event of a pipeline release were identified,
30 TransCanada re-evaluated the locations of EFRDs to determine if relocating or adding
31 additional valves could further mitigate the risk to HCAs.

32
33 **Q. DID TRANSCANADA MODIFY THE LOCATION OR ADD ADDITIONAL**
34 **EMERGENCY FLOW RESTRICTING DEVICES IN ORDER TO HELP**
35 **PROTECT AN HCA IN THE EVENT OF A RELEASE?**

36
37 A. Yes. After TransCanada reviewed the initial list of valve locations and the location of
38 pipe segments that could affect an HCA, they made several modifications in the State of
39 South Dakota. This included the addition of one (1) valve and the relocation of three (3)
40 valves.

41
42 **Q. TO THE EXTENT THAT DATA IS AVAILABLE, DOES IT APPEAR THAT**
43 **TRANSCANADA KEYSTONE PIPELINE, LP IS IN COMPLIANCE WITH**
44 **PART 195 §195.452 AND THE SPECIAL PERMIT CONDITIONS?**

45
46 A. To the extent data is available, yes.

1 Q. ARE THERE ANY CONDITIONS THAT YOU RECOMMEND AS PART OF
2 GRANTING THE SITING PERMIT FOR SOUTH DAKOTA? IF SO, WHAT
3 ARE THEY?

4
5 A. No.
6

Engineering

Jenny Hudson, P.E.

Project Manager, Technology

Education	BS, Geological Engineering, University of Missouri, Rolla, Missouri, 1997
Professional Registrations	Professional Engineer, Illinois
Professional Certifications	NACE – International Cathodic Protection Technologist (CP Level 3)
Continuing Education and Training	NACE International AC Mitigation Course NACE International Designing for Corrosion Control Course
Professional Accomplishments	Co-Author of "Cathodic Protection of a Large-Diameter Distribution System: Corrosion Monitoring and Testing", American Water Works 2004 DSS conference
Summary of Experience	Ms. Hudson has over nine years of cathodic protection and pipeline integrity experience. Project experience includes developing pipeline integrity procedures, implementing External Corrosion Direct Assessment methodology and cathodic protection design work.
Project Experience	<p>Southern Star Central Gas Pipeline Develop written integrity management plan procedures and supporting documentation including ECDA and ICDA plans. Manage implementation of External Corrosion Direct Assessment methodology as well as review and analyze data. Provide support for Long Range Ultrasonic Testing including procedure development and notification to PHMSA. Actively participate in PHMSA jurisdictional audit.</p> <p>Vectren Energy Delivery Develop written integrity management plan procedures and supporting documentation. Provide support for Long Range Ultrasonic Testing including procedure development and notification to PHMSA.</p> <p>Oklahoma Natural Gas Perform gap analysis of written integrity management plan. Provide documented feedback on plan including recommended modifications.</p> <p>Nicor Gas Perform and manage External Corrosion Direct Assessment projects. Provide support for Long Range Ultrasonic Testing including procedure development and notification to PHMSA.</p> <p>DTE / Michcon Manage implementation of External Corrosion Direct Assessment and Internal Direct Assessment projects. Provide support for Long Range Ultrasonic Testing including procedure development and notification to PHMSA.</p>

ENEngineering

Jenny Hudson, P.E. (continued)
Project Manager, Technology

Project Experience (cont'd)	United States Gypsum Develop Integrity Management Plan. Manage External Corrosion Direct Assessment. Perform risk analysis and risk ranking. Perform on-site review of integrity management and O&M records.
------------------------------------	--

Alvord, Burdick and Howson
Corrosion evaluation surveys for over 30 miles of PCCP and steel water transmission main. Testing included structure-to-electrolyte readings, AC readings, isolation flange testing, Panhandle Eastern Testing, stray current interference testing and close-interval survey. Project also included analysis of data and recommendations.

Northwest Suburban Municipal Joint Action Water Agency
Evaluation of cathodically protected PCCP water transmission main. Testing included close-interval survey (on, instant off and depolarized), isolation flange testing and cathodic protection test point readings. Project also included analysis of data and recommendations.